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1979 Insect Pest Management Guide

COMMERCIAL VEGETABLE CROPS And GREENHOUSE VEGETABLES

You must be certified as a pesticide applicator to use restricted-use pesticides.

See your county Extension adviser in agriculture for information.

Commercial vegetable gardeners find it impossible to produce vegetables profitably unless they control insects at maximum efficiency and minimum cost. The housewife of today will not accept unsightly wormy vegetables; not only are wormy fruits and vegetables unappetizing but the waste from trimming increases food costs. Thus the commercial vegetable gardener must produce a quality product that is acceptable and safe to the consumer. Careful use of the right insecticides will enable him to do this.

Insect pest management programs, which include the wise selection of cultural, mechanical, biological, and chemical methods, are suggested for the major insect pests of vegetable crops and greenhouses. But, insecticides are still the most efficient means of managing most insects.

This suggested insecticide guide has been prepared for use by Illinois commercial vegetable farmers; it is not for home gardeners, who should use only those insecticides that are extremely safe to handle, apply, and store. Furthermore, the commercial vegetable gardener must use a wider variety of insecticides than the home gardener in order to obtain maximum insect control at the least cost.

In using insecticides, read the label and carefully follow the instructions. Do not exceed maximum rates suggested; observe carefully the interval between application and harvest, and apply only to crops for which use has been approved. Make a record of the product used, the trade name, the percentage content of the insecticide, the dilution, the rate of application per acre, and the dates of application.

Some of the insecticides suggested here can be poisonous to the applicator. In using them, the commercial grower is expected to use precautions to protect himself, his workers, and his family from undue or needless exposure.

In using this guide, always refer to the table on the next page, which lists the limitations and restrictions on use. These limitations apply to the vegetables as human food. If you use any portion of a vegetable for livestock food (tops, stalks, etc.) refer to the label for instructions as to the interval required between application and feeding.

The chemical names used in these tables may be unfamiliar to you. These names are the common coined chemical names and as such are not capitalized. Trade names are capitalized. In the table of limitations the common names are listed first. If the trade name is more commonly used, it is listed in parentheses following the common name. Throughout the tables of suggestions, however, the common name is used if there is one. In case of question, refer to the table of limitations.

These suggestions are subject to change without notification during the growing season.

Requested label clearances for a few uses of insecticides, carriers, and solvents are uncertain for 1979, since many requests have not been officially cleared. Anticipating needed changes in labeling, we began modifying these suggested uses a few years ago. Be sure to check with your county Extension adviser if you are in doubt about the insecticide you plan to use. We will make announcements of label changes through the newsletters and news media to keep you up to date.

Insecticides are being classified for *general use* or *restricted use* by the U.S. Environmental Protection Agency. A person wishing to use an insecticide classified for restricted use must be certified as a private or commercial pesticide applicator by the Illinois Department of Agriculture. Contact your county Extension adviser in agriculture for details on this program. Only a few insecticides have been classified at this time. More will be classified later. Insecticides bearing a restricted-use classification are identified by an asterisk (*) in this circular.

Suggestions for use of insecticides effective from a practical standpoint are based on available data. Soil textures, pH of the soil, rainfall, slope of the field, wind velocity at planting, method and accuracy of application, and other unpredictable factors affect efficiency.

This publication was prepared by entomologists of the University of Illinois College of Agriculture and the Illinois Natural History Survey.

LIMITATIONS FOR FIELD VEGETABLES IN DAYS BETWEEN APPLICATION AND HARVEST AND OTHER RESTRICTIONS ON USE OF INSECTICIDES IN ILLINOIS

(Blank spaces indicate that the material is not suggested for the specific use in Illinois)

Insecticide	Beans	Peas	Broccoli	Brussels sprouts	Cabbage	Cauliflower	Horse-radish ¹	Radish ¹	Turnip ¹	Onions	Eggplant	Peppers	Tomatoes
acephate (Orthene).....	...	...	...	...	...	...	...	...	...	...	...	7	...
*azinphosmethyl (Guthion) ²	...	...	15	7	21	15	...	...	...	...	...	...	...
<i>Bacillus thuringiensis</i> ³.....	...	...	0	0	0	0	...	...	...	...	...	...	0
carbaryl (Sevin).....	0	...	3	3	3	3	3	3	3, 14A	...	0	0	0
carbofuran (Furadan).....	...	...	...	...	...	...	...	...	...	...	...	21B	...
Dasanit.....	...	...	...	...	...	...	...	...	...	C, D	...	...	...
*demeton (Systox).....	...	...	...	...	...	...	...	...	...	...	...	3	...
diazinon.....	...	...	5	...	7	5	...	10	10	10	...	...	1
dicofol (Kelthane).....	7E	...	...	...	...	...	...	...	...	...	2	2	2
dimethoate (Cygon).....	0E	0E	7	...	3	7	...	...	14	...	...	0	7
Dyfonate.....	...	...	C	...	C	C	...	...	...	...	...	...	...
ethion.....	...	...	...	...	...	...	...	...	...	C	...	...	...
malathion.....	1	...	3	7	7	7	7	7	3	3	3	3	1
*methomyl (Lannate).....	1	1, 5A	3	3	1	3	...	...	...	...	...	10	2
mevinphos (Phosdrin) ².....	...	...	1	3	1	3	...	...	3	...	...	...	...
Monitor.....	...	...	21	21	35	28	...	...	...	...	...	...	...
naled (Dibrom).....	...	...	1	1	1	1	...	...	4	...	...	...	...
oxydemetonmethyl (Meta-Systox R).....	...	...	...	...	...	...	...	...	...	...	7F	0B	...
*parathion ²	7	...	7	7	10	7	...	15	10	...	15	15	10
phorate (Thimet) ²	C	...	...	...	...	...	...	...	...	...	...	...	...
rotenone.....	...	...	...	...	...	...	...	...	...	...	1	1	1
trichlorfon (Dylox).....	...	...	...	21	21	21	...	...	28E	...	...	21	21

Insecticide	Potatoes ¹	Collards	Kale	Lettuce	Spinach	Swiss chard	Sweet corn	Cucumbers ⁴	Melons ⁴	Pumpkins ⁴	Squash ⁴	
											Winter	Summer
<i>Bacillus thuringiensis</i> ³.....	...	0	0	0	0	...	...	...	...	...	...	...
carbaryl (Sevin).....	0	14	14	14	14	14	0	0	0	0	0	0
diazinon.....	...	10	10	10	10	12	C	7	3	...	3	7
dicofol (Kelthane).....	...	...	...	...	...	...	...	2	2	2	2	2
dimethoate (Cygon).....	0	14	14	14	14	14	...	...	3	...	...	...
Dyfonate.....	...	...	...	...	...	...	C	...	...	...	...	...
malathion.....	0	7	7	14	7	7	5	1	1	3	1	1
*methomyl (Lannate).....	6	...	...	10	7	...	0, 3A	3	3	...	...	3
*mevinphos (Phosdrin) ².....	...	3	3	2	4	...	...	...	...	...	...	...
Mocap.....	...	...	...	...	...	...	C	...	...	...	...	...
naled (Dibrom).....	...	4	4	1	1	1	...	...	...	...	...	...
*parathion ²	5	10	10	21	14	21	12	15	7	10	15	15
phorate (Thimet) ²	C	...	...	...	...	...	C	...	...	...	...	...
rotenone.....	...	1	1	1	1	1	...	...	...	...	...	...
trichlorfon (Dylox).....	...	28G	21	28G	...	...	...	...	...	3F	...	...

* Use restricted to certified applicators only.

¹Root crops such as radishes, turnips, carrots, horseradish, potatoes, and sugar beets should not be grown in soil where aldrin, dieldrin, or heptachlor was applied as a soil insecticide the preceding year.

²Use only by professional applicators or commercial gardeners.

³Trade names are Bactur, Dipel, and Thuricide.

⁴Only apply insecticide late in the day after blossoms have closed to reduce bee kill.

A. If tops or stover are to be used as feed.

B. Not more than twice per season.

C. Soil applications at planting time only.

D. Do not use on green onion crop.

E. Do not use tops for feed or food.

F. Not more than three times per season.

G. Not after edible portions or heads begin to form.

REENTRY INTERVALS FOR WORKER PROTECTION

Insecticide	Hours
azinphosmethyl (Guthion).....	24
demeton (Systox).....	48
ethion.....	24
parathion.....	48

Workers must wear protective clothing if they enter treated fields before the time intervals shown at the right. They must also wear protective clothing for all other insecticides applied if the spray has not dried or the dust has not settled.

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CABBAGE AND RELATED COLE CROPS

Insect	Time of attack	Insecticide	Pounds of active ingredient per acre	Placement	Timing of application
Cabbage maggot ¹ (NHE-44)	All season	diazinon	3	Broadcast	Disk in just before planting. Use only for cabbage, cauliflower, and broccoli.
		Dyfonate	2		
		diazinon granules	1	Furrow	At time of planting; on turnips a drenching spray of 1 lb. diazinon should be applied 30 days following treatment.
		*azinphosmethyl	3 oz. W.P. or 2 oz. E.C. per 50 gal. transplant water		6 fluid oz. transplant water per plant.
Aphid (NHE-47) Thrips (NHE-48)	All season	diazinon	4 oz. per 50 gal. transplant water		
		*azinphosmethyl	$\frac{3}{4}$	Foliage	When aphids appear, but before leaves begin to curl.
		dimethoate	0.3		
		malathion	1		
Diamond-back moth larva; imported cabbage worm; cabbage looper (NHE-45)	All season	*mevinphos	$\frac{1}{4}$		
		*parathion	0.4		
Cutworm	At planting	<i>Bacillus thuringiensis</i>	See rates on label	Foliage	When small worms first appear, and about every 5 to 7 days thereafter. Thorough spray coverage of foliage is important.
		*methomyl	0.45-0.9		
		Monitor	1		
Flea beetle and leafhopper	All season	carbaryl	1½	Foliage	As needed.

* Use restricted to certified applicators only.

¹ Maggots are resistant to diazinon in some areas of Illinois.
E.C. = emulsion concentrate; W.P. = wettable powder.

COLLARDS, KALE, LETTUCE, SPINACH, SWISS CHARD

Insect	Time of attack	Insecticide	Pounds of active ingredient per acre	Placement	Timing of application
Aphid (NHE-47)	All season	diazinon	$\frac{1}{2}$	Foliage	As needed.
		dimethoate	0.3		
		*mevinphos	$\frac{1}{4}$		
		naled	1		
		*parathion	0.4		
Cutworm	On seedling plants	trichlorfon	1	Base of plant and soil	When first damage appears.
Leafhopper	All season	carbaryl	1½	Foliage	When first leafhoppers appear and as needed.
		dimethoate	0.3		
		malathion	1		
Caterpillar (NHE-45)	All season	<i>Bacillus thuringiensis</i>	See rates on label	Foliage	When small worms first appear and every 5 to 7 days thereafter.
		methomyl ¹	0.45		
		naled	1		
Leaf miner	All season	diazinon	$\frac{1}{2}$	Foliage	When first miners are observed.
		dimethoate	0.3		
		*parathion	0.4		
Flea beetle	All season	carbaryl	1	Foliage	As needed.
		rotenone	$\frac{1}{4}$		

* Use restricted to certified applicators only.

¹ Use limited to lettuce and spinach only.

BEANS

Insect	Time of attack	Insecticide	Pounds of active ingredient per acre	Placement	Timing of application
Seed maggot (NHE-27)	All season	diazinon 50% W.P. ¹	3/5 oz./bu.	Seed	Treat seed no longer than 3 months before planting.
		Lorsban 25% W.P. ¹	2 oz./bu.	Seed	
		phorate granules	1½	Soilband	Place on either or both sides of row at planting but not in contact with seed.
Bean leaf beetle (NHE-67)	Early and late season	carbaryl	1	Foliage	When feeding first appears and weekly for 2 or 3 applications as needed.
		malathion	1		
Leafhopper (NHE-22) and plant bug (NHE-68)	All season	carbaryl	1	Foliage	Before plants become yellow and stunted. Repeat applications at weekly intervals as necessary.
		dimethoate	0.3		
		malathion	1	Soilband	As for seed maggot.
		*methomyl	0.45		
Mexican bean beetle	Midseason and late season	phorate granules	1½	Soilband	As for seed maggot.
		carbaryl	1½	Foliage	When occasional leaves show lacework feeding.
		malathion	1	Foliage	
Aphid (NHE-47)	All season	phorate granules	1½	Soilband	As for seed maggot.
		dimethoate	0.3	Foliage	Usually applied when a few aphids can be found on each plant, but before leaves begin to curl and deform.
		malathion	1	Foliage	
Blister beetle (NHE-72)	Midseason and late season	phorate granules	1½	Soilband	As for seed maggot.
		carbaryl	1½	Foliage	As needed.
Corn earworm (NHE-33)	Late season	carbaryl	1½	Foliage	As needed, but usually after September 1. Worms may be present before bloom.
		*methomyl	0.45		
Corn borer		*parathion	½		
Mites	Midseason and late season	dicofol	0.4	Foliage	As needed, but especially during drouthy periods particularly if carbaryl has been used on crops.
		dimethoate	0.3		
		malathion	1	Soilband	As for seed maggot.
		phorate granules	1½		

* Use restricted to certified applicators only.

¹ No restrictions when used as recommended.

CUCUMBERS AND OTHER VINE CROPS¹

Insect	Time of attack	Insecticide ²	Pounds of active ingredient per acre	Placement	Timing of application ¹
Striped and spotted cucumber beetles (NHE-46)	Seedling to mature plants	carbaryl	1	Foliage	When beetles first appear; as often as necessary thereafter.
		*parathion	½		
Aphid (NHE-47)	All season	diazinon	½	Foliage	When aphids become noticeable.
		dimethoate ²	0.3		
		malathion	1		
		*parathion	½		
Squash bug (NHE-51)	All season	*parathion	½	Foliage	Do not apply until first eggs are found hatching (about June 15 to July 15).
		trichlorfon ³	1		
Leafhopper	July-August	malathion	1	Foliage	As needed.
		dimethoate ²	0.3		
Squash vine borer	June-September	carbaryl	1	Base of stem for 3 ft.	Weekly applications when vines begin to run—usually 5 applications.
Pickle worm	August-September	carbaryl	1	Foliage	Weekly applications, beginning in late August.
Mites	July-September	dicofol	½	Foliage	As needed.
		malathion	1		
		*parathion	½		
Cutworm (NHE-77)	April-June	carbaryl	2	Base of plants	As needed.

* Use restricted to certified applicators only.

¹ Spray vine crops with insecticide only late in the day after blossoms have closed to reduce bee kill.

² Do not use dimethoate on cucumbers.

³ Pumpkin is the only vine crop for which trichlorfon can be used for squash bug control.

TOMATOES AND EGGPLANT

Insect	Time of attack	Insecticide	Pounds of active ingredient per acre	Placement	Timing of application
Cutworm (NHE-77)	Early and midseason	carbaryl trichlorfon	2 1	Base of plants or foliage	As needed.
Flea beetle	May-June	carbaryl rotenone	2 0.2-0.4	Foliage	Apply every week as long as needed.
Aphid (NHE-47)	May-July	diazinon dimethoate ¹ malathion *parathion	$\frac{1}{4}$ 0.3 1 0.4	Foliage	As needed, but before leaves curl.
Cabbage looper	July-September	<i>Bacillus thuringiensis</i> *methomyl	See rates on label 0.45-0.9	Foliage	When loopers are present.
Corn earworm Corn borer	July-September; occasionally in June	carbaryl *methomyl ¹	2 0.45-0.9	Foliage	Add to weekly applications of fungicide sprays beginning at first fruit set. If spraying is infrequent, use 6 lb. of toxaphene.
Hornworm	July-September	carbaryl trichlorfon	2 1	Foliage	When first small worms appear.
Mites	July-September	carbophenothion dicofol malathion *parathion	1 $\frac{1}{2}$ 1 0.4	Foliage	As needed.
Russet mite	July-September	*parathion sulfur dust ² sulfur spray ²	0.4 10 10	Foliage	As needed.
Blister beetle (NHE-72)	June-September	carbaryl *parathion	$1\frac{1}{2}$ $\frac{1}{4}$	Foliage	As needed.
Fruit fly and picnic beetle	August-October	diazinon spray diazinon granules pyrethrin dust ²	$\frac{1}{2}$ 1 1	Foliage	When flies or beetles first appear. Apply to hamper immediately after it is filled.

* Use restricted to certified applicators only.

¹ Use cleared only on tomatoes.

² No limitations on use.

PEPPERS

Insect	Time of attack	Insecticide	Pounds of active ingredient per acre	Placement	Timing of application
Aphid (NHE-47)	May-July	dimethoate demeton *methomyl oxydemetonmethyl acephate	0.3 $\frac{3}{8}$ 0.45 $\frac{1}{2}$ $\frac{1}{2}$	Foliage	Only when aphids are present. Add to borer spray when it is being used.
Corn borer	Late season	carbaryl acephate carbofuran	2 1 2-3	Foliage and fruit Soilband to transplant	When fruit is present on plant. Apply every 5 days when borers are present. Make 2 applications; first, 3 weeks after transplant, second, 5 weeks later.

* Use restricted to certified applicators only.

ASPARAGUS

Insect	Time of attack	Insecticide	Pounds of active ingredient per acre	Placement	Timing of application
Asparagus beetle (NHE-49)	Early and mid-season on spears and ferns	carbaryl ¹ malathion ¹ rotenone ¹	$1\frac{1}{2}$ 1 0.2-0.4	Spears and ferns Spears	As needed, not more often than every 3 days. As needed.

¹ One-day restriction between last application and harvest.

SWEET CORN

Insect	Time of attack	Insecticide	Pounds of active ingredient per acre	Placement	Timing of application
Soil insects (NHE-26, 27, 43)	April-August	diazinon	1	Row	Apply on soil surface behind planter shoe and ahead of press wheel.
		Dyfonate	1		
		Mocap	1		
		phorate	1		
Cutworm (NHE-38)	April-June	carbaryl ¹ carbaryl bait	2-3 1	Base of plants	When first damage appears.
Flea beetle (NHE-36)	April-July	carbaryl ¹	1½	Foliage	As necessary.
Japanese beetle (NHE-32)	July-September	carbaryl ¹	1	Ear zone	As necessary.
Corn borer	June-September	carbaryl ¹ *methomyl	2 0.45	Foliage	Make first application when tassel ratio is 30 to 40. Repeat every 4 to 5 days as long as field has 20 or more unhatched egg masses per 100 plants.
Corn earworm ² (NHE-33)	June-September	carbaryl ¹ *methomyl	2 0.45	Ear zone	Market corn: At first silk and every 2 to 3 days for 5 to 8 applications. On very early or late planted corn, treatment may be necessary before silking when eggs are being laid on stalks and flag leaves. Canning corn: At 30 to 50% silk and every 3 days thereafter until corn is within 8 to 12 days of harvest.
Sap beetle (NHE-10)	July-September	carbaryl ¹	2	Foliage	When adults first appear in field; usually between pollen-shedding and silk-drying.
Picnic beetle		diazinon malathion *parathion	1 1 ½		
Corn leaf aphid (NHE-29)	July-September	malathion *parathion	1 ½	Foliage	As needed to produce attractive ears for fresh market.
Fall armyworm	July-September	*methomyl *parathion	0.45 ½	Foliage	Apply to ear zone when whorl feeding is evident.

* Use restricted to certified applicators only.

¹ During pollen shed, apply carbaryl as late in the day as possible (preferably after 4 p.m.) to reduce bee kill.

² Addition of 0.5 to 0.75 pound of parathion or 0.25 to 0.45 pound of methomyl to carbaryl improves earworm control.

ONIONS

Insect	Time of attack	Insecticide	Pounds of active ingredient per acre	Placement	Timing of application
Onion maggot (NHE-50)	All season	diazinon	½-1 for 40-50 lb.	Seed	Seed treatment for set onions only. Use lighter dosage of diazinon on sandy, highly mineral soils.
		W.P.	of seed		
		ethion W.P.	1 for 40-50 lb. of seed	Furrow	Use 1 lb. active ingredient per acre for rows 12" apart; ¾ lb. for rows 18" apart; ½ lb. for rows 24" apart. Up to twice these amounts are needed for ethion on muck soils. Do not use Dasanit or Dyfonate on green onions.
		Dasanit granules	1		
		diazinon granules	½-1		
		Dyfonate	1		
		ethion granules	½-2	Broadcast	Preplanting; disk into upper 1 to 2 inches of soil. Supplement with foliage spray below.
		diazinon	2		
		diazinon	⅓	Foliage	Supplemental to soil treatment. Make first application when first adult flies are seen; make another 1 week later. From then on only as necessary.
		malathion	1		
Thrips (NHE-48)	Midseason and late season	diazinon malathion	½ 1	Foliage	When injury first appears and every 10 days as necessary.

POTATOES

Insect	Time of attack	Insecticide	Pounds of active ingredient per acre	Placement	Timing of application
Flea beetle	May-July	carbaryl *methomyl	1 0.45	Foliage	When first damage appears on leaves, and repeat as needed.
Colorado potato beetle	May-July	carbaryl	1	Foliage	As needed.
Potato leafhopper (NHE-22)	May-July	carbaryl	1	Foliage	Weekly applications when leafhoppers first appear.
		dimethoate	0.3		
		*methomyl	0.45		
		phorate granules	2-3	Soilband	Place on either or both sides of row at planting but not in contact with seed. Use lower rate on sandy soils and heavier rate on heavy soils. Do not use on muck soils.
Aphid (NHE-47)	All season	dimethoate	0.3	Foliage	As needed.
		malathion	1		
		*methomyl	0.45		
		*parathion	¼		
		phorate granules	2-3	Soilband	
Blister beetle (NHE-72)	All season	carbaryl	1½	Foliage	As needed.
Wireworm (NHE-43) White grub (NHE-23)	All season	phorate granules	2-3	Soil	Preplanting, disk in; or use as soilband at planting.
Grasshopper (NHE-74)	July-September	carbaryl	¾	Foliage	As needed, control in fence rows, roadsides, ditch banks, etc., before migration.

* Use restricted to certified applicators only.

PEAS

Insect	Time of attack	Insecticide	Pounds of active ingredient per acre	Placement	Timing of application
Caterpillars including loopers	June	*methomyl	½-1	Foliage	Before harvest if worms are present.
Aphids	May-June	dimethoate	⅓	Foliage	As needed.

* Use restricted to certified applicators only.

Limitations for Greenhouse Tomatoes

Insecticide	Tomatoes
endosulfan (Thiodan)	15 hours
malathion	15 hours
metaldehyde	As bait applied only to soil
naled (Dibrom)	1 day
*parathion ¹	10 days

* Use restricted to certified applicators only.

¹ Do not use aerosols that contain parathion, tepp, or the propellant methyl chloride in greenhouses connected to living quarters.

GREENHOUSE TOMATOES

Insect	Insecticide ¹	Dosage and formulation	Application
Aphid	malathion aerosol	1 lb. 10% aerosol per 50,000 cu. ft.	In a closed greenhouse above plants.
Whitefly	naled vapor	5 oz. of 4% E.C. per 50,000 cu. ft.	Apply on steampipes.
	*parathion aerosol	1 lb. 10% aerosol per 50,000 cu. ft.	In a closed greenhouse above plants.
Mealybug		Use malathion or parathion aerosol as suggested for aphid and whitefly.	
Spider mite			
Russet mite			
Thrip			
Armyworm	malathion aerosol	1 lb. 10% aerosol per 50,000 cu. ft.	In a closed greenhouse above plants.
Cabbage looper	*parathion aerosol	1 lb. 10% aerosol per 50,000 cu. ft.	In a closed greenhouse above plants.
Cutworm			
Tomato fruitworm			
Slug	metaldehyde	Commercially prepared bait or spray	To mulch on soil surface. Do not contaminate edible parts.

* Use restricted to certified applicators only.

¹ See page 7 for limitations between application and harvest.

FOR ADDITIONAL INFORMATION

Obtain the following circulars on insect control from the Office of Agricultural Publications, 123 Mumford Hall, Urbana, Illinois 61801.

Circular 899, 1979 Insect Pest Management Guide —
Field and Forage Crops

Circular 900, 1979 Insect Pest Management Guide —
Home, Yard, and Garden

Circular 1076, Turfgrass Pest Control

Leaflets describing the life history, biology, and habits of some of the insects mentioned can be obtained from the offices of county Extension advisers or by writing to Entomology Extension, 169 Natural Resources Building, Urbana, Illinois 61801. These are indicated by an NHE number in the tables.

FOR YOUR PROTECTION

Always handle insecticides with respect. The persons most likely to suffer ill effects from insecticides are the applicator and his family. Accidents and careless, needless overexposure can be avoided. Here are a few easy rules that if followed will prevent most insecticide accidents:

1. Wear rubber gloves when handling insecticide concentrates.
2. Do not smoke while handling or using insecticides.
3. Keep your face turned to one side when opening insecticide containers.
4. Leave unused insecticides in their original containers with the labels on them.
5. Store insecticides out of reach of children, irresponsible persons, or animals; store preferably in a locked cabinet.
6. Triple-rinse and bury or burn all empty insecticide containers or take to an approved sanitary landfill.
7. Do not put the water-supply hose directly into the spray tank.

8. Do not blow out clogged nozzles or spray lines with your mouth.

9. Wash with soap and water exposed parts of body and clothes contaminated with insecticide.

10. Do not leave puddles of spray on impervious surfaces.

11. Do not apply to fish-bearing or other water supplies.

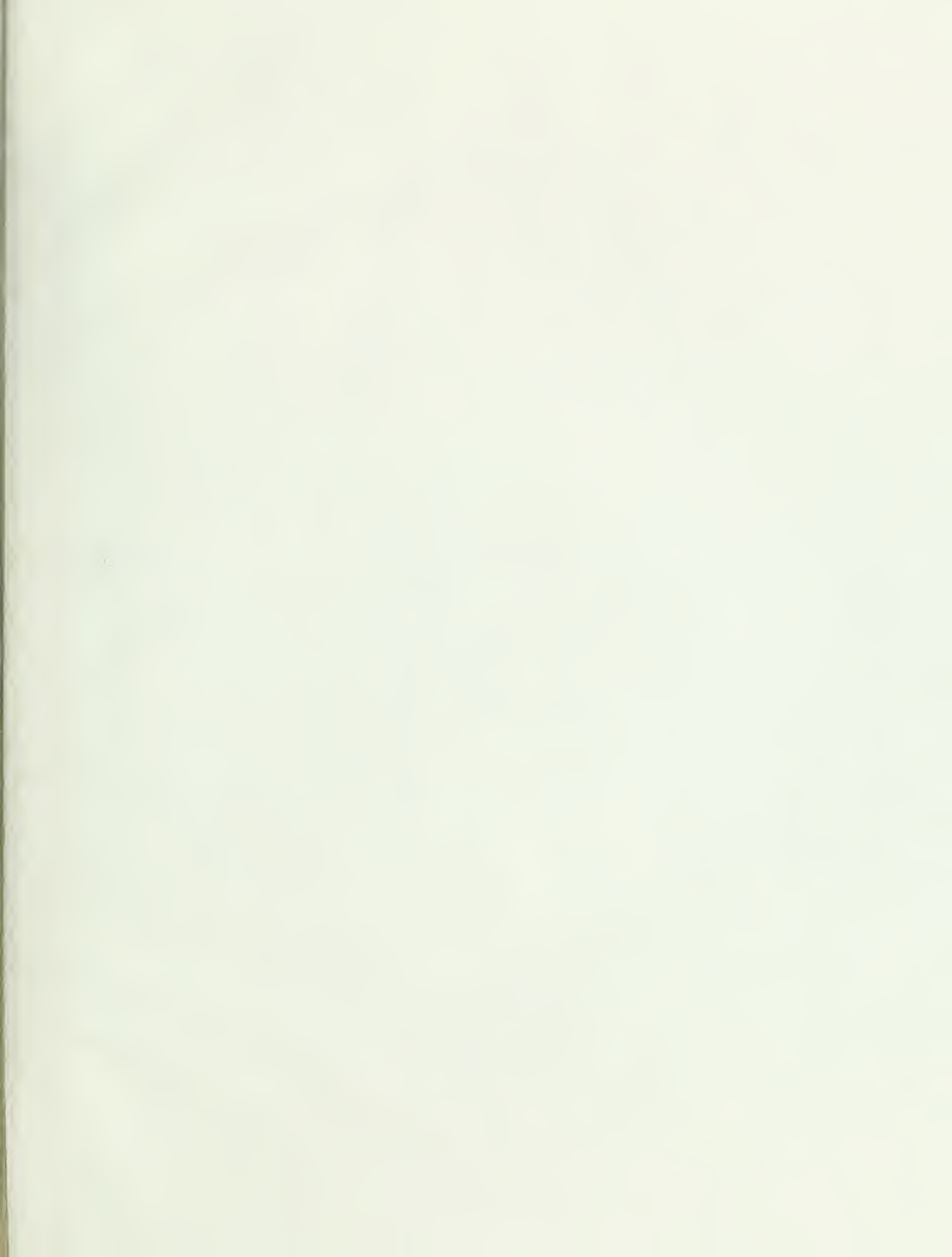
12. Do not apply insecticides, except in an emergency, to areas with abundant wildlife or to blossoming crops visited by bees. Avoid drift onto blossoming crops or onto bee hives.

13. Do not apply insecticides near dug wells or cisterns.

14. Do not spray when weather conditions favor drift.

15. Observe all precautions listed on the label.

16. To avoid bee kill, apply insecticides after bee activity has been completed for the day; use the least toxic materials. *Warn beekeepers that you are applying insecticides.*



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